EFFECT OF MULTIFACTORIAL INTERVENTION PACKAGE ON BLOOD PRESSURE AND QUALITY OF LIFE AMONG ADOLESCENTS IN SELECTED AREAS OF PUDUCHERRY

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CHAPTER - I

INTRODUCTION

1.1 Background of the study

Hypertension, also known as high blood pressure, is a prevalent and alarming health concern among adolescents worldwide. The increasing incidence of hypertension in this vulnerable population is linked to several risk factors, including sedentary lifestyles, unhealthy dietary habits, and elevated stress levels. If left unmanaged, hypertension during adolescence can have serious long-term consequences, including an increased risk of cardiovascular diseases.

To address this pressing issue, researchers and healthcare professionals have been exploring multi-factorial intervention approaches that encompass a comprehensive set of strategies aimed at improving knowledge, reducing blood pressure, managing stress, and enhancing the overall quality of life among adolescents with hypertension. These interventions typically combine lifestyle modifications, health education programs, and stress reduction techniques to create a holistic and effective management approach.

This study aims to investigate the impact of a multi-factorial intervention package on adolescents with hypertension. The intervention includes elements such as dietary advice, beetroot juice administration, autogenic training exercise and structure health education programs. By targeting multiple factors contributing to hypertension, the intervention intends to provide a more comprehensive and sustainable approach to manage the condition.

1.2 AIM

The aim of the study is to evaluate the effectiveness of the Multi-factorial Intervention Package on blood pressure and Quality of Life among adolescents with Hypertension.

1.3 OBJECTIVES

The objectives of the present study were segmented into phases, the objectives were follows,

Phase – I: To estimate the prevalence of hypertension among adolescents aged 14 to 17 years in selected areas of Puducherry.

Phase - II

1. To assess the level of knowledge, blood pressure, stress, and quality of life among adolescents with hypertension before and after administration of a multi-factorial intervention package.

2. To evaluate the effectiveness of multi-factorial intervention package on level knowledge, blood pressure, stress, and quality of life among adolescents with hypertension.

3. To correlate the level of knowledge, blood pressure, stress, and quality of life of adolescents with hypertension.

4. To find out the association between pretest level of knowledge, blood pressure, stress, and quality of life among adolescents with hypertension and their selected demographic variables.

1.4 HYPOTHESES

Hypothesis was framed based on the objectives of the present study, the study adopted the following hypothesis,

- **H1:** There is a significant difference in the level of knowledge, blood pressure, stress, and quality of life of adolescents with hypertension before and after administration of the multi- factorial intervention package.

- **H2**: There is a significant Correlation exists between the level of knowledge, blood pressure, stress, and quality of life of adolescents with hypertension in the experimental and control group.

- **H3**: There is a significant association exists between the level of knowledge, blood

pressure, stress, quality of life of adolescents with hypertension, and related demographic variables.

1.5 DELIMITATIONS:

1. The study is delimited to adolescents with Hypertension in selected areas of Puducherry.

2. The study is delimited to 238 adolescents with Hypertension in both experimental and control group.

CHAPTER - II

REVIEW OF LITERATURE

Quantitative descriptive cross-sectional research was conducted in India to examine the knowledge about hypertension and prevalence of hypertension among adolescents aged 13-17 years. The results revealed that a significant portion of the participants (73.8%) had inadequate knowledge about hypertension risk factors. Furthermore, the study also identified varying stages of hypertension among the adolescents.[1].

The study conducted in northern India examined 3385 students to determine the prevalence of pre-hypertension, hypertension and obesity among adolescents. Results showed that blood pressure increased with age in both genders, with male having higher mean systolic blood pressure and diastolic blood pressure than females. Hypertension prevalence was higher in females (13.1%) compared to males (9.5%), while pre-hypertension was nearly equal in both genders. Hypertension was significantly associated with BMI for age in both groups [2].

The study conducted in USA shows that respondents with hypertension were more likely to report fair or poor health status and poor quality of life. The study found that participants those aware of their hypertension has better health related quality of life [3].

The study conducted in China reported that 1224 eligible participants was examined health related quality of life. The results revealed that hypertension was associated with poorer physical functioning, bodily pain and social function. It was also suggested that higher education, marital status, higher incomes etc tended to have better health related quality of life among participants with hypertension [4].

The cross-sectional study conducted in Brazil revealed that data from 71,553 adolescents shows the association between blood pressure levels and the Dietary Approaches to Stop Hypertension (DASH) score components. Results showed that 11% of those in the highest tertial of the DASH score had high blood pressure. The intake of sugar sweetened beverages and processed meat, sodium intake exceeded the recommended levels.[5].

In a randomized controlled trail conducted among 93 students aged 19-49 participants were divided into groups, one received weekly sessions on autogenic training, another on laughter therapy, and third received no intervention. The results showed that autogenic training group experienced significant reductions in state and trait anxiety levels. Additionally, the autogenic training group demonstrated lowered systolic and diastolic blood pressure, as well as pulse rate, post-treatment [6].

Double blind, randomized, placebo-controlled crossover study involved 15 women and 15 men. Participants received either 500g of beetroot and apple juice or a placebo juice and had their blood pressure measured at regular intervals using an ambulatory monitor for 24 hours after consumption. The results showed a trend towards lower systolic blood pressure 6 hours after

drinking beetroot juice compared to placebo ($p=0.064$). These findings suggest that beetroot and apple juice may have a beneficial effect on lowering blood pressure, particularly in men [7].

CONCEPTUAL FRAMEWORK:

This research study is aimed at assessing the effectiveness of life style modification strategies on reducing blood pressure among adolescent hypertensive patients/clients. The researcher has explored various theoretical concepts and adopted the prescriptive theory (1964), developed by Ernestine Wiedenbach[183], as the basis of conceptual framework for this study. Wiedenbach's vision of nursing practice closely follows the assessment, implementation, and evaluation steps of the nursing process is a helping art model. This theory involves a target directed, intentional building of thoughts, awareness, procedures to understand the patient and his condition, circumstances and need to enhance his potential, advance his care, avoid reoccurrence of the problem and to deal with apprehension, disability and suffering. The major factors covered in the model are, namely, central purpose, prescription and realities.

CHAPTER - III

METHODOLOGY

A methodology is a systematic approach to conducting research or solving problems involving well-defined procedures and techniques. It serves as a road map, guiding researchers in gathering data, analyzing findings, and drawing meaningful conclusions. The present study follows the following procedure to fulfill its aim:

1. **Research approach:** Quantitative research approach was chosen for this present study
2. **Research design:** This study encompasses two phases. **Phase I** adopted a **descriptive cross-sectional survey design**, and **Phase II** adopted a **Randomised Control Design-Repeated measures design**.
3. **Variables of the study:** Two types of variables are present in the study, i.e., Dependent and Independent variables. The dependent variables in the current study were knowledge of the prevention and management of hypertension, Blood pressure levels, Stress levels, and quality of life. The independent variables include a multi-factorial intervention package, a structured health education program, beetroot juice administration, and autogenic training exercises.
4. **Research setting:** The selected areas of Ariyankuppam commune panchayat of Puducherry district, India, were chosen as the study setting for both phases of the study.
5. **Population:** The population of the present study includes adolescents aged 14–17 years living in the union territory of Puducherry.
6. **Sample:** In the present study, the samples were hypertensive adolescents aged between 14 and 17 who fulfilled the inclusion criteria
7. **Sampling technique:** In **Phase I, the multi-stage cluster sampling technique** was adopted for selecting areas in Puducherry's union territory, followed by selecting areas in the Ariyankuppam commune panchayat. In **Phase II, the purposive sampling method** was adopted to select study participants. A true experimental study was conducted in the selected Ariyankuppam commune panchayat, and the participants were selected for the experimental and control group studies.

8. **Sample size:** In **Phase I,** 1200 samples were estimated to identify the prevalence of hypertension among adolescents. While conducting the research study, it was found that 1142 people had been selected based on inclusion criteria. In **Phase II,** 260 samples were estimated during data collection, of which 273 were found to be **Stage I hypertensive**. During intervention phase considering 20% attrition rate 238 samples (119 Experimental 119 Control). After that, the effectiveness of a multi-factorial intervention package on various dependent variables was identified.
9. **Description of the study tool:** The tool comprises two sections, i.e., **Section I**: Identifies the baseline characteristics data of adolescents, their anthropometric parameters, and their blood pressure levels. **Section II**: Identifies adolescents' knowledge level using structured interview questionnaires, stress levels using perceived stress scale & quality of life by WHO-BREF scale.
10. **Description of the Intervention:** The intervention package for the experimental group was the Multi-factorial Intervention package, which encompassed the administration of beetroot juice, autogenic training exercises, and a structured health education program on lifestyle modification and management of hypertension. In detail, the administration of 250 ml of beetroot juice, an autogenic training exercise for 30 minutes for 21 days, and a structured health education programme on lifestyle modification and management of hypertension among adolescents were conducted for 55 minutes. Control Group: The intervention for the control group consists of a structured health education program was given by excluding the dietary advice and beetroot administration
11. **Data Collection:** Prior permission was obtained from the competent authority before the commencement of the study. A pilot study was conducted before the main study. Oral and written informed consent was obtained from the participants and their parents. The detailed intervention and study plan were explained briefly to the study participants. The intervention period of 21 days was followed for each participant, and every 7^{th} day the effectiveness of the intervention was measured, i.e., the 7^{th}, 14^{th}, and 21^{st} days.
12. **Data analysis:** Data analysis is used to organize and interpret the data obtained during the research study. The collected data were entered into a Microsoft spreadsheet and coded. SPSS software (Version 22.0) was used to analyze the coded data. Descriptive and Inferential statistics were used to analyze the raw data.

CHAPTER – IV & V

RESULTS & DISCUSSION

Phase I deals with the analysis and interpretation of the data collected from *1142 adolescents to estimate the prevalence of Hypertension among Adolescents aged (14 to 17 years) at Puducherry.* The results of Phase I follows

SECTION A: DESCRIPTION OF THE DEMOGRAPHIC AND CLINICAL VARIABLES OF ADOLESCENTS

Table 1: Frequency and percentage-wise distribution of demographic and clinical variables of Adolescents.

(N=1142)

Sl. No	emographic Variables	Normal	Stage I Hypertension	Stage II Hypertension	evated BP	Total
1	**Age of the adolescent (in years)**					
	14 years	79(6.91%)	48(4.20%)	60(5.25%)	2(0.17%)	189(16.5%)
	15 years	183(16.02%)	88(7.70%)	90(7.88%)	3(0.26%)	364(31.8%)
	16 years	183(16.02%)	80(7.0%)	62(5.42%)	3(0.26%)	328(28.7%)
	17 years	114(9.98%)	57(4.99%)	84(4.72%)	6(0.52%)	261(22.8%)
	Mean±S.D	**15.57±1.26**				
	χ2 values	**23.501 (*0.05*) ***				
2	**Sex**					
	Male	430(37.65%)	169(14.79%)	165(14.44%)	8(0.70%)	772(67.60%)
	Female	129(11.29%)	104(9.10%)	131(11.47%)	6(0.52%)	370(32.39%)
	χ2 values	**45.925 (*0.000*) ****				

3	**Religion**					
	Hindu	552(48.33%)	248(21.71%)	290(25.39%)	13(1.13%)	1103(96.5)
	Christian	7(0.61%)	20(1.75%)	4(0.35%)	1(0.08%)	32(2.80%)
	Muslim	0	5(0.43%)	2(0.17%)	0	7(0.61%)
	Others	0	0	0	0	0
	χ2 values	**39.322 (*0.000*) ****				
4	**Residence**					
	Urban	199(17.42%)	103(9.01%)	91(7.96%)	8(0.70%)	401(35.11%)
	Rural	360(31.52%)	170(14.88%)	205(17.95%)	6(0.52%)	741(64.88%)
	χ2 values	**6.341 (*0.096*) NS**				
5	**Kuppuswamy Socio-economic status scale 2021**					
	Upper	0	0	0	0	0
	Upper middle	2(0.17%)	84(7.35%)	3(0.26%)	1(0.08%)	90(7.88%)
	Lower middle	549(48.07%)	182(15.93%)	292(25.56%)	4(0.35%)	1027(89.9%)
	Upper lower	8(0.70%)	5(0.43%)	1(0.08%)	9(0.78%)	23(2.01%)
	Lower	0	2(0.17%)	0	0	2(0.17%)
	χ2 values	**549.435 (*0.000*) ****				
6	**Height (cm)**					
	Mean±S.D.	**157.40±8.90**				
7	**Weight (kg)**					
	Mean±S.D.	**56.93±11.65**				
8	**Body Mass Index (BMI)**					
	Severe thin	7(0.61%)	0	7(0.61%)	4(0.35%)	18(1.57%)
	Thin	29(2.53%)	0	9(0.78%)	17(1.48%)	55(4.81%)
	Normal	267(23.38%)	9(0.78%)	117(10.24%)	138(12.0%)	531(46.4%)
	Overweight	172(15.06%)	3(0.26%)	79(6.91%)	70(6.12%)	324(28.3%)
	Obesity	84(7.35%)	2(0.17%)	61(5.34%)	67(5.86%)	214(18.7%)
	Mean±S.D.	**22.92±3.89**				
	χ2 values	**19.25 (*0.0830*) NS**				

***Significant at p-value <0.005, ** significant at p-value <0.001, NS – Non - Significant**

Table 1 shows the frequency and Percentage wise distribution of demographic and clinical variables of normal and hypertensive adolescents. In this study, the majority of the adolescents (31.8%) belonged to the age group of 15 years in both normal and hypertensive adolescents, with a mean age of 15.57 years. This finding aligns with previous research by **[8],** who observed a higher prevalence of hypertension among adolescents aged 14-15 years. Most were male, accounting for 67.6% of the study population. This observation is consistent with the study conducted by (9) that reported a higher prevalence and found that 31.75% of the boys. In terms of religion, the majority of the adolescents belong to Hindu (96.5%), and most of them reside in rural areas (64.8%). Most of the adolescents (89.9%) were normal and hypertensive adolescents from the lower middle class. The BMI of the participants was found to be normal (46.4%). This result is consistent with the findings of (10) that the mean BMI of the study participants was recorded as

21.6. **The chi-square ($\chi 2$) values of age ($p<0.05$), sex ($p<0.001$), religion ($p<0.001$), and socioeconomic status ($p<0.001$) were found to be significantly associated with the prevalence of hypertension among adolescents.**

SECTION B: ASSESSMENT OF THE DIET PATTERN OF ADOLESCENTS.

Table 2: Frequency and percentage wise distribution of diet pattern of Adolescents.

(N=1142)

Sl. No	Diet Pattern	Normal	Stage I Hypertension	Stage II Hypertension	vated BP	Total
1	**During the past 7 days, how frequently you had consumed fruits?**					
	Daily	532(46.5%)	238(20.8%)	284(24.68%)	1(0.08%)	1055(92.3%)
	Two or more days a week	10(0.87%)	29(2.53%)	10(0.87%)	9(0.78%)	58(5.07%)
	Once a week	16(1.40%)	5(0.43%)	1(0.08%)	4(0.35%)	26(2.27%)
	Didn't take	1(0.08%)	1(0.08%)	1(0.08%)	0	3(0.26%)
	χ2 values	**188.28 (*0.000*) ****				
2	**During the past 7 days, how frequently you had consumed vegetables?**					
	Daily	550(48.1%)	261(22.8%)	291(25.48%)	7(0.61%)	1109(97.1%)
	Two or more days a week	7(0.61%)	11(0.96%)	4(0.35%)	6(0.52%)	28(2.45%)
	Once a week	2(0.17%)	1(0.08%)	1(0.08%)	1(0.08%)	5(0.43%)
	Didn't take	0	0	0	0	0
	χ2 values	**118.69 (*0.000*) ****				
3	**During the past 7 days, how frequently you had consumed non vegetarian foods?**					
	Daily	4(0.35%)	2(0.17%)	0	0	6(0.52%)
	Two or more days a week	538(47.1%)	242(21.1%)	288(25.21%)	3(0.26%)	1071(93.7%)
	Once a week	16(1.40%)	28(2.45%)	7(0.61%)	11(0.96%)	62(5.42%)
	Didn't take	1(0.08%)	1(0.08%)	1(0.08%)	0	3(0.26%)
	χ2 values	**173.50 (*0.000*) ****				
4	**During the past 7 days, how frequently you had consumed junk foods?**					
	Daily	541(47.3%)	236(20.6%)	292(25.56%)	0	1069(93.6%)
	Two or more days a week	12(1.05%)	35(3.06%)	3(0.26%)	12(1.05%)	62(5.42%)
	Once a week	5(0.43%)	2(0.17%)	0	1(0.08%)	8(0.70%)
	Didn't take	1(0.08%)	0	1(0.08%)	1(0.08%)	3(0.26%)
	χ2 values	**268.24 (*0.000*) ****				
	What type of oil is used for cooking in your household?					
	Coconut	1(0.08%)	1(0.08%)	1(0.08%)	0	3(0.26%)
	Groundnut oil	6(0.52%)	4(0.35%)	3(0.26%)	3(0.26%)	16(1.40%)

5	Gingelly oil	2(0.17%)	1(0.08%)	1(0.08%)	0	4(035%)
	Palm oil	2(0.17%)	2(0.17%)	0	0	4(035%)
	Refined sunflower oil	548(47.9%)	265(23.2%)	291(25.4%)	11(0.96%)	1115(97.6%)
	Others	0	0	0	0	0
	χ2 values	**44.02 (*0.000*) ****				
6	**How much salt is used in your family in the last month?**					
	1 kg	548(47.98%)	260(22.7%)	293(25.6%)	14(1.22%)	1115(97.6%)
	2 kgs	11(0.96%)	13(1.13%)	2(0.17%)	0	26(2.27%)
	3 kgs	0	0	1(0.08%)	0	1(0.08%)
	4 kgs	0	0	0	0	0
	χ2 values	**14.38 (*0.026*) ***				

***Significant at p-value <0.005, ** significant at p-value <0.001, NS – Non - Significant Table 2** shows the frequency and percentage distribution of diet patterns of normal and hypertensive adolescents. The results indicated that most adolescents (92.3%) reported consuming fruits daily over the past 7 days, both normal and hypertensive adolescents. This result is similar to the study conducted by Amma et al. [8] that most adolescents (80%) consumed fruits one or more times a day. Similarly, 93.7% of the participants in both normal and hypertensive adolescents reported daily consumption of vegetarian foods during that period. Furthermore, most participants (93.7%) reported consuming non-vegetarian foods two or more days per week. In terms of junk food consumption majority of normal and hypertensive adolescents (93.6%) reported consuming such foods daily within the past 7 days. Additionally, a significant proportion of the participants (97.6%) reported using refined sunflower oil for cooking. Finally, in the last month, many adolescents (97.6%) reported using 1 kg of salt. This result matches the findings of kurnianto A et al. [11] that 93.3% of the participant's sodium intake was higher. **The chi-square (χ2) value of fruit consumption (p<0.001), vegetable consumption (p<0.001), non-vegetarian foods consumption (p<0.001), types of oil used for cooking (p<0.001) and salt consumption (p<0.001) found significantly associated with the prevalence of hypertension among adolescents.**

SECTION C: ASSESSMENT OF THE PHYSICAL ACTIVITY OF ADOLESCENTS.

Table 3: Frequency and percentage wise distribution of physical activity of Adolescents.

(N=1142)

Sl. No	Physical Activity	Normal	Stage I Hypertension	Stage II Hypertension	vated BP	Total
1	**How will you reach school daily?**					
	Cycle	10(0.8%)	16(1.40%)	2(0.17%)	5(0.43%)	33(2.8%)
	Walking	535(46.8%)	245(21.4%)	287(25.1%)	2(0.17%)	1069(93.6%)
	Bus/van/auto	5(0.43%)	2(0.17%)	2(0.17%)	4(0.35%)	13(1.13%)
	Motorcycle	9(0.78%)	10(0.8%)	5(0.43%)	3(0.26%)	27(2.36%)
	χ2 values	**197.55 (*0.000*) ****				
2	**How often do you play outdoor games like kabadi/cricket/volley ball/basketball, etc. in a week?**					
	Daily	11(0.96%)	4(0.35%)	2(0.17%)	7(0.61%)	24(2.1%)
	Once a week	9(0.78%)	11(0.96%)	6(0.52%)	2(0.17%)	28(2.45%)
	Two or more days a week	529(46.3%)	250(21.8%)	286(25.04%)	3(0.26%)	1068(93.5%)
	Don't play	10(0.87%)	8(0.70%)	2(0.17%)	2(0.17%)	22(1.92%)
	χ2 values	**192.13 (*0.000*) ****				
3	**How many hours you will play outdoor games per day?**					
	<1 hour	533(46.6%)	256(22.4%)	283(24.7%)	2(0.17%)	1074(94%)
	1-2 hour	12(1.05%)	8(0.70%)	6(0.52%)	9(0.78%)	35(3.06%)
	>2 hours	10(0.87%)	8(0.70%)	6(0.52%)	3(0.26%)	27(2.36%)
	Not at all	4(0.35%)	1(0.08%)	1(0.08%)	0	6(0.52%)
	χ2 values	**207.05 (*0.000*) ****				
4	**How many hours you will watch TV daily?**					
	<1 hour	4(0.35%)	1(0.08%)	1(0.08%)	0	6(0.52%)
	1-2 hour	538(47.1%)	254(22.2%)	285(24.9%)	11(0.96%)	1088(95.2%)
	>2 hours	16(1.4%)	18(1.57%)	9(0.78%)	3(0.26%)	46(4.02%)
	Not at all	1(0.08%)	0	1(0.08%)	0	2(0.17%)
	χ2 values	**19.96 (*0.018*) ***				

***Significant at p-value <0.005, ** significant at p-value <0.001, NS – Non - Significant**

Table 3 shows the frequency and percentage distribution of physical activity of normal and hypertensive adolescents. According to the findings, the results showed that most adolescents (93.6%) walk to school daily. Additionally, 93.5% of the participants in both normal and hypertensive adolescents reported engaging in outdoor games such as kabaddi, cricket, football etc., for two or more days per week. This result is to the findings of Amma et al. [8] that both normal (75.2%) and hypertensive adolescents (24.8%) spend <3 Days in a week for physical activity. It was also reported that 94% of adolescents spend less than one hour per day playing outdoor games. This result was not under the findings of Rahimi H et al. [12] that adolescents used to spend a minimum of 9hrs per week in physical activity. Furthermore, most adolescents (95.2%) reported spending one to two hours watching TV daily. **The chi-square ($\chi 2$) value of physical activity such as mode of reaching school ($p<0.001$), types of outdoor games often played ($p<0.001$), hours spent playing outdoor games ($p<0.001$), and hours spent watching television ($p<0.001$) was found significantly associated with the prevalence of hypertension among adolescents.**

SECTION D: ASSESSMENT OF PREVALENCE OF HYPERTENSION AMONG ADOLESCENTS.

Table 4: Frequency and percentage wise distribution of prevalence of hypertension among Adolescents.

(N=1142)

Classification	Prevalence of Hypertension	
	Frequency (n)	**Percentage (%)**
Normotensive (<120/<80 mmHg)	559	48.9%
Stage I Hypertension (130/80 to 139/89 mmHg)	273	23.9%
Stage II Hypertension (>140/90 mmHg)	296	25.9%
Elevated BP (120/<80 to 129/<80mmHg)	14	1.2%
Systolic BP (Mean±S.D)	123.26±14.93	
Diastolic BP (Mean±S.D)	81.78±5.60	

Table 4 shows the frequency and percentage distribution of the prevalence of hypertension among adolescents. The data indicate that among the total population screened & interviewed, 48.9% had normal blood pressure levels. Specifically, 25.9% of the adolescents were diagnosed with Stage II hypertension, while 23.9% were diagnosed with Stage I hypertension. Moreover, 1.2% of the participants were found to have elevated blood pressure. The mean systolic blood pressure of the participants was recorded as 123.26 mmHg, while the mean diastolic blood pressure was measured at 81.78 mmHg. These statistics provide insights into the distribution of blood pressure levels among the screened population, with a significant proportion exhibiting hypertension at different stages.

Phase II deals with the analysis and interpretation of the data collected from 238(119+119) adolescents with hypertension ***"to evaluate the effectiveness of the Multi-factorial Intervention Package on blood pressure and quality of life among adolescents with hypertension in selected areas of Puducherry"***. The results of Phase II follow,

Section A: Description of the demographic variables, diet pattern and physical activity variables among adolescents with hypertension in the experimental and control groups.

Table 1: Frequency and percentage-wise distribution of demographic variables among adolescents with hypertension in the experimental group and control group

(N=238 (119+119))

S.no	Demographic variables	rimental group		ontrol group		Chi-square X^2 and P-Value
		N	%	n	%	
1	**Age of the adolescent (in years)**					X^2=7.56 p =0.056 NS
	14 years	19	16	28	23.5	
	15 years	30	25.2	41	34.5	
	16 years	39	32.7	32	26.9	
	17 years	31	26.1	18	15.1	
2	**Sex**					X^2=0.643 p =0.423 NS
	Male	71	59.7	77	64.7	
	Female	48	40.3	42	35.3	
3	**Religion**					X^2=2.24 p =0.326 NS
	Hindu	111	93.3	114	95.8	
	Christian	6	5	2	1.7	
	Muslim	2	1.7	3	2.5	
	Others	0	0	0	0	
4	**Residence**					X^2=1.48 p =0.223 NS
	Urban	47	39.5	38	31.9	
	Rural	72	60.5	81	68.1	
5	**Kuppuswamy Socio-economic status scale 2021**					X^2=6.48 p =0.09 NS
	Upper	0	0	0	0	
	Upper middle	39	32.8	24	20.2	
	Lower middle	76	63.9	93	78.2	
	Upper lower	3	2.5	2	1.6	
	Lower	1	0.8	0	0	

S – Significant; NS – Non-Significant; HS – Highly Significant

The majority of adolescents, 39(32.7%) in the experimental group, were in the age group of 16 years, and 41(34.5%) control group were in the age group of 15 years. The majority of adolescents, 71(59.7%) in the experimental group and 77(64.7%) control group were male. Regarding the Religion of adolescents, 111(93.3%) in the experimental group and 114(95.8%) control group belonged to Hindu, respectively. About Residence, the majority of adolescents, 72(60.5%) in the experimental group and 81(68.1%) control group, were Rural. Regarding adolescents' Socioeconomic status, 76(63.9%) in the experimental group and 93(78.2%) control group belonged to the Lower middle, respectively.

Table 2: Frequency and percentage wise distribution of diet pattern variables among adolescents with hypertension in experimental group and control group (N=238 (119+119))

S. No	Diet pattern variables	xperimental group		Control group		Chi-square X^2 and P-Value
		n	%	N	%	
1	**During the past 7 days, how frequently you had fruits**					
	Daily	106	89.1	111	93.3	X^2=1.91 p =0.590 NS
	Two or more days a week	9	7.6	6	5	
	Once a week	3	2.5	2	1.7	
	Didn't take	1	0.8	0	0	
2	**During the past 7 days, how frequently you had vegetables**					X^2=1.21 p =0.544 NS
	Daily	117	98.3	115	96.6	
	Two or more days a week	2	1.7	3	2.5	
	Once a week	0	0	1	0.9	
	Didn't take	0	0	0	0	
3	**During the past 7 days, how frequently you had non vegetarian foods**					
	Daily	2	1.7	0	0	X^2=4.44 p =0.217 NS
	Two or more days a week	111	93.3	117	98.3	
	Once a week	5	4.2	2	1.7	
	Didn't take	1	0.8	0	0	
4	**During the past 7 days, how frequently you had foods like samosa/bajji/noodles/ice creams/chips-lays, kurkure, etc.**					X^2=3.38 p =0.184 NS
	Daily	109	91.6	100	84	
	Two or more days a week	9	7.6	18	15.1	
	Once a week	1	0.8	1	0.9	
	Didn't take	0	0	0	0	
5	**What type of oil is used for cooking**					
	Coconut	1	0.8	0	0	X^2=3.01 p =0.555 NS
	Ground nut oil	3	2.6	1	0.8	
	Gingelly oil	0	0	1	0.8	
	Palm oil	1	0.8	1	0.8	
	Refined sunflower oil	114	95.8	116	97.6	
	Others	0	0	0	0	
6	**How much salt is used in your family in the last month**					
	1 kg	116	97.5	114	95.8	X^2=0.517 p =0.472 NS
	2 kgs	3	2.5	5	4.2	
	3 kgs	0	0	0	0	
	4 kgs	0	0	0	0	

S – Significant; NS – Non-Significant; HS – Highly Significant

Table 2 shows the diet pattern of the adolescents in the experimental and control group. 89.1% in the experimental group and 93.3% control group had consumed fruits daily. 98.3% in the experimental group and 96.6% of participants in the control group consumed vegetables daily. Most participants in the experimental (93.3%) and control group (98.3%) had Two or more days a week of non-vegetarian foods, respectively. 91.6% of adolescents in the experimental group and 84% in the control group consumed junk foods daily. Most of the participants used refined sunflower oil for cooking of adolescents in the experimental group (95.8%) and 97.6% in the control group. The majority of adolescents, 116(97.5%) in the experimental group and 114(95.8%) control group had 1 kg of salt in the last one month.

Table 3: Frequency and percentage wise distribution of physical activity variables among adolescents with hypertension in experimental group and control group

(N=238 (119+119))

S.NO	SICAL ACTIVITY VARIABLES	ERIMENTAL GROUP		ONTROL GROUP		Chi-square X^2 and P-Value
		n	%	N	%	
1	**How will you reach school daily**					X^2=1.003 p =0.606 NS
	Cycle	7	5.9	4	3.4	
	Walking	107	89.9	111	93.3	
	Bus/van/auto	0	0	0	0	
	Motorcycle	5	4.2	4	3.3	
2	**How often do you play outdoor games like kabadi/cricket/volley ball/basket ball, etc. in a week**					X^2=2.54 p =0.467 NS
	Daily	3	2.5	1	0.8	
	Once a week	7	5.9	4	3.4	
	Two or more days a week	104	87.4	111	93.3	
	Don't play	5	4.2	3	2.5	
3	**How many hours you will play outdoor games per day**					X^2=5.36 p =0.147 NS
	<1 hour	107	89.9	115	96.6	
	1-2 hour	6	5	1	0.8	
	>2 hours	5	4.2	3	2.6	
	Not at all	1	0.9	0	0	
4	**How many hours you will watch TV daily**					X^2=2.11 p =0.348 NS
	<1 hour	1	0.8	0	0	
	1-2 hour	108	90.8	113	95	
	>2 hours	10	8.4	6	5	
	Not at all	0	0	0	0	

S – Significant; NS – Non-Significant; HS – Highly Significant

Table 3 shows the adolescents' physical activity in the experimental and control groups. It shows that most adolescents walked daily to reach school in the experimental group (89.9%) and the control group (93.3%). It was reported that two or more days a week, outdoor games like kabaddi/cricket/volleyball/basketball, etc., was played by the participants in the experimental group (87.4%) and control group (93.3%). It was also reported that <1 hour was spent by the adolescents in the experimental group (89.9%) and control group (96.6%) playing outdoor games. Most adolescents watch 1-2 hours of television in the experimental group (90.8%) and the control group (95%).

Table 4: Frequency and percentage wise distribution of pre-test and post-test of the level of Body Mass Index among adolescents with hypertension in experimental group and control group

(N=238 (119+119))

S.No.	Body Mass Index	Experimental group		Control group		hi-square X^2 and P-Value
		n	%	n	%	
1	**PRE-TEST**					
	Severe thin	5	4.2	0	0	**X^2=230.15 p =0.000 **HS**
	Thin	9	7.6	0	0	
	Normal	105	88.2	2	1.7	
	Over weight	0	0	68	57.1	
	Obesity	0	0	49	41.2	
	Mean ± S.D.	20.06±1.87		26.25±3.40		
2	**POST-TEST**					
	Severe thin	0	0	0	0	**X^2=215.26 p =0.000 **HS**
	Thin	11	9.2	0	0	
	Normal	108	90.8	6	5	
	Over weight	0	0	74	62.2	
	Obesity	0	0	39	32.8	
	Mean ± S.D.	20.16±1.67		26.19±3.41		

S – Significant; NS – Non-Significant; HS – Highly Significant

Table 4 shows the frequency and percentage-wise distribution of pre-test and post-test of the level of Body Mass Index among adolescents with hypertension in the experimental and control groups. In the pre-test, the Majority of adolescents, 105(88.2%) in the experimental group, were normal Body Mass Index, and 68(57.1%) control group were overweight, with a mean difference in the pre-test was 20.06±1.87. In the post-test, the Majority of adolescents, 108(90.8%) in the experimental group, were normal Body Mass Index and 74(62.2%), with a mean difference in the post-test, was 20.16±1.67 but in the control group were Overweight. These findings are consistent with the study conducted by Kishor Kumar et al., which reported that 27.1% of adolescents with hypertension had a normal BMI. In comparison, 30.8% were categorized as overweight & obese[13]. **The X2 value and p-value for the pre-test and post-test of the level of Body Mass Index show that adolescents in the experimental and control groups were statistically highly significant.**

Section B: Assessment of pre-test and post-test of the level of knowledge, blood pressure, stress and quality of life among adolescents with hypertension before and after administration of a multi-factorial intervention package in experimental group and control group.

Table 5: Frequency and percentage-wise distribution of pre-test and post-test of the level of knowledge among adolescents with hypertension before and after administration of a multi- factorial intervention package in experimental & control groups.

(N=119)

EXPERIMENTAL GROUP					CONTROL GROUP			
LEVEL OF KNOWLEDGE	**PRETEST**		**POSTTEST**		**PRETEST**		**POSTTEST**	
	n	**%**	**N**	**%**	**n**	**%**	**n**	**%**
Inadequate knowledge	71	59.7	0	0	65	54.6	57	47.9
Moderately adequate knowledge	48	40.3	26	21.8	54	45.4	62	52.1
Adequate knowledge	0	0	93	78.2	0	0	0	0
Total	**119**	**100**	**119**	**100**	**119**	**100**	**119**	**100**
Mean±Standard deviation	13.22±2.73		27.82±4.15		11.41±4.26		11.87±2.72	

Table 5 shows the frequency and percentage distribution of pre-test and post-test levels of knowledge among adolescents with hypertension before and after administering a multi-factorial intervention package. It reveals that the majority of participants had inadequate knowledge in the experimental group (59.7%) and in the control group (54.6%) in the pre-test and post-test adequate knowledge was gained in the experimental group (78.2%) and moderately adequate knowledge (52.1%) was acquired after the intervention of the multi-factorial package. A Similar study conducted by Grad I (14) aimed to assess the level of knowledge about hypertension among adolescents and found that 13.1% had an unsatisfactory level of knowledge about hypertension and its complications.

Figure 1:- Frequency and percentage-wise distribution of pre-test and post-test of the level of blood pressure among adolescents with hypertension before and after administration of a multi-factorial intervention package in the experimental group.

(N=119)

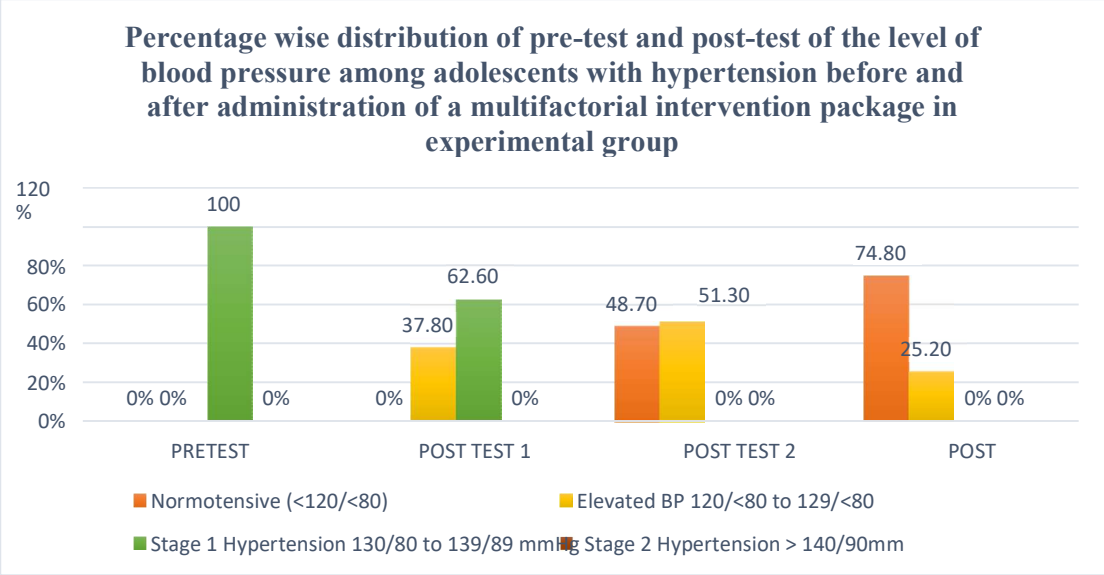
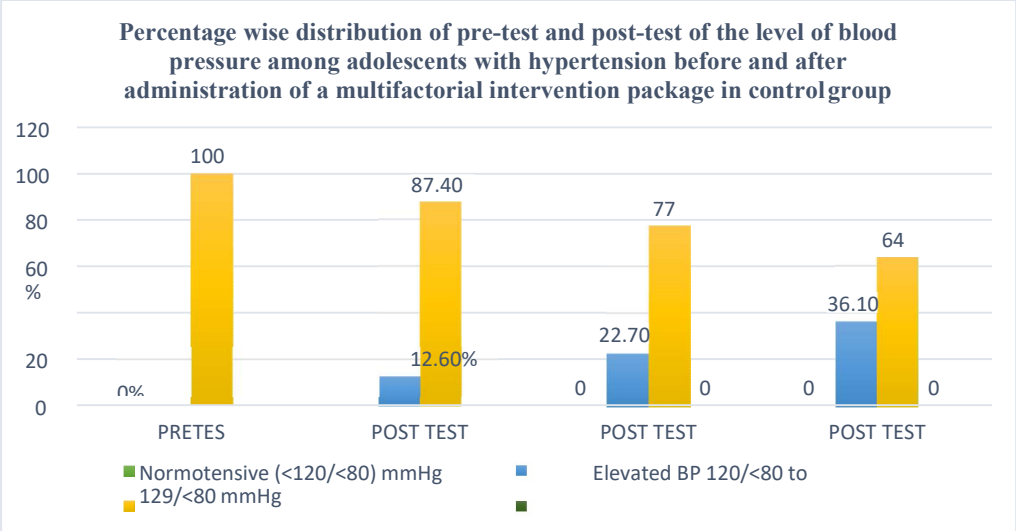


Figure 2: Frequency and percentage wise distribution of pre-test and post-test of the level of blood pressure among adolescents with hypertension before and after administration of a multi-factorial intervention package in control group.

(N=119)



Figures 1 & 2 show the systolic and diastolic blood pressure distribution among hypertensive adolescents in both experimental and control groups. It was revealed that the mean systolic blood pressure values of adolescents in the experimental and control groups were 132.24±3.68 and 138.45±1.59, respectively, with a mean difference of 6.21±2.09. Within the experimental group, the mean difference between pre-test to post-test I, II, & III were 1.89±1.09, 11.69±2.02, &18.42±0.58, respectively. These results indicate a highly statistically significant change in mean systolic blood pressure values in the experimental group at post-test I ($p<0.001$), post-test II ($p<0.001$), and post-test III ($p<0.001$), with a significance level of $p<0.001$.

The mean pre-test diastolic blood pressure values of the experimental and control groups were 80.39±1.12 and 81.33±2.05, respectively, with a mean difference of -0.94±0.93. In the experimental group, the pre-test to post-test values showed a mean difference between post-test I to post-test III of 1.899±0.62, 5.403±0.25, & 9.50±0.04. A similar pattern of mean difference was observed in the diastolic blood pressure values from pre-test to post-test I ($p<0.001$), post-test II ($p<0.001$), and post-test III ($p<0.001$) between the experimental and control groups. These findings demonstrate a highly significant change in the mean difference of diastolic blood pressure values in the experimental group with a significance level of $p<0.001$.

One of the components included in the intervention package was beetroot, which contains dietary nitrate known for its potential to lower blood pressure. The present study also found that the consumption of beetroot juice reduced blood pressure levels among the study participants. These findings are consistent with the results reported by Dewi [15], who observed a significant decrease in diastolic blood pressure by 5mm Hg and systolic blood pressure by 15.86mmHg among study participants after consuming beetroot juice six times over one week ($p<0.000$). Another Serguei V et al. study revealed that autogenic training exercise reduces SBP in both mild and moderate essential hypertension in old patients [16].

Table 6:- Frequency and percentage-wise distribution of pre-test and post-test of the level of stress among adolescents with hypertension before and after administration of a multi- factorial intervention package in experimental & control groups.

(N=119)

EXPERIMENTAL GROUP					CONTROL GROUP			
LEVEL OF STRESS	**PRETEST**		**POST TEST**		**PRETEST**		**POST TEST**	
	N	**%**	**N**	**%**	**N**	**%**	**n**	**%**
Low level of Stress	0	0	46	38.7	0	0	22	18.5
Moderate level of Stress	91	76.5	73	61.3	84	70.6	97	81.5
High level of Stress	28	23.5	0	0	35	29.4	0	0
Total	**119**	**100**	**119**	**100**	**119**	**100**	**119**	**100**
Mean±Standard deviation	28.75±5.16		7.97±6.35		26.29±0.458		25.62±5.07	

Table 6 shows the frequency and percentage distribution of pre-test and post-test stress levels among adolescents with hypertension before and after administering a multi-factorial intervention package. It reveals that most participants had moderate to higher levels of stress in the experimental group (76.5% & 23.5%). In the control group 38.7% & 61.3%, in the pre-test and post-test, the stress level was reduced to a moderate level to a low level in the experimental group (61.3% & 38.7%) and in the control group (81.5% & 18.5%) respectively. It shows that multi-factorial intervention was very effective in compacting the stress levels of adolescents. A similar study conducted by Kanji N et al. demonstrated that an 8-week course of autogenic training exercise for nursing student volunteers significantly reduced stress levels by at least 33% compared to the control group [6]. It was postulated that autogenic training exercises reduced psychological dysfunctions and disorders by activating sympathetic and parasympathetic nervous activities and offering body relaxation.

Table 7:- Frequency and percentage-wise distribution of pre-test and post-test quality of life among adolescents with hypertension before and after administration of a multi-factorial intervention package in experimental & control groups.

(N=119)

EXPERIMENTAL GROUP					**CONTROL GROUP**			
QUALITY OF LIFE	**PRETEST**		**POST TEST**		**PRETEST**		**POST TEST**	
	N	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Very poor	32	26.9	0	0	59	49.6	13	10.9
Poor	57	47.9	0	0	55	46.2	47	39.5
Neither poor nor good	30	25.2	0	0	5	4.2	59	49.6
Good	0	0	95	79.8	0	0	0	0
Very Good	0	0	24	20.2	0	0	93	78.2
Total	**119**	**100**	**119**	**100**	**119**	**100**	**119**	**100**
Mean±Standard deviation	49.58±18.11		105.04±10.07		37.77±10.75		39.48±13.40	

Table 7 shows the frequency and percentage distribution of pretest and post-test quality of life among adolescents with hypertension before and after administering a multi-factorial intervention package. It shows that most participants in both groups reported a very poor quality of life (49.6%). This finding is consistent with a study conducted by Sadykova D & Lutfullin I [17], Which focused on the quality of life in young people with elevated blood pressure. In the post-test, the mean quality of life scores for the experimental and control groups were 105.04±10.07 & 39.48±13.40, respectively. The observed changes in the mean difference between the groups from the pretest to the post-test were statistically significant at $p<0.001$. These findings are supportive by the study conducted by Babu A S et al. (18). The study showed significant improvements in functional outcomes and improved quality of life, with an increase of 4.6 units and 5.7 units in the physical & mental component scores, respectively, after the administration of home-based exercise training.

Section C: Comparison of the level of knowledge, blood pressure, stress and quality of life of adolescents with hypertension between experimental and control groups before and after administration of a multifactorial intervention package.

Table – 8 Comparison of the level of knowledge of adolescents with hypertension between experimental and control groups before and after administration of a multi-factorial intervention package.

(N=238 (119+119))

Test	Group	Mean	Standard deviaton	Mean difference	95% confidence interval for mean		Independent t test value	'p' value
					LOWER	UPPER		
Pretest	**Experimental group**	13.22	2.731	1.807	0.892	2.721	3.891	**0.000** HS**
	Control group	11.41	4.265					
Posttest	**Experimental group**	27.82	4.150	15.941	15.04	16.83	35.02	**0.000** HS**
	Control group	11.87	2.726					

p<0.001 HS- highly significant, NS-Non-Significant.

Pretest level of knowledge:

The mean score of Comparison of level of knowledge of adolescents with hypertension in **pretest** of **Experimental group** was 13.22±2.731 and the mean score in the **control group** was 11.41±4.265. The calculated **independent t test** value of t = 3.891 shows ***statistically highly significant difference*** between level of knowledge of adolescents with hypertension in experimental and control group of pretest.

Post-test level of knowledge:

The mean score of Comparison of level of knowledge of adolescents with hypertension in **posttest** of **Experimental group** was 27.82±4.150 and the mean score in the **control group** was 11.87±2.726. The calculated **Independent t test** value of t = 35.02 shows ***statistically highly significant difference*** between level of knowledge of adolescents with hypertension in experimental and control group of **post-test**.

Table – 9 Comparison of the blood pressure level [systolic and diastolic blood pressure] of adolescents with hypertension between experimental and control groups before and after administration of a multi-factorial intervention package.

(N=238 (119+119))

Test		Group	Mean	Standard deviaton	Mean difference	95% confidence interval for mean		Independent t test value	'p' value
						Lower	Upper		
Systolic blood pressure	Pretest	**Experimental group**	132.24	3.682	-6.21	-6.94	-5.49	-16.91	**0.000** HS**
		Control group	138.45	1.593					
	Posttest 1	**Experimental group**	130.34	4.770	-7.94	-8.91	-6.96	-16.02	**0.000** HS**
		Control group	138.29	2.545					
	Posttest 2	**Experimental group**	120.54	1.661	-17.70	-18.01	-17.39	-112.5	**0.000** HS**
		Control group	138.24	0.431					
	Posttest 3	**Experimental group**	113.82	4.264	-24.07	-25.05	-23.09	-48.56	**0.000** HS**
		Control group	137.89	3.326					
Diastolic blood pressure	Pretest	**Experimental group**	80.39	1.122	-0.93	-1.35	-0.51	-4.35	**0.000** HS**
		Control group	81.33	2.051					
	Posttest 1	**Experimental group**	78.50	0.502	-2.80	-3.21	-2.39	-13.54	**0.000** HS**
		Control group	81.30	2.204					
	Posttest 2	**Experimental group**	74.99	1.375	-6.24	-6.72	-5.76	-25.76	**0.000** HS**
		Control group	81.24	2.258					
	Posttest 3	**Experimental group**	70.89	0.722	-10.26	-10.86	-9.67	-34.23	**0.000** HS**
		Control group	81.16	3.192					

*****p<0.001 HS- highly significant, NS-Non Significant.***

SYSTOLIC BLOOD PRESSURE

Pretest level of blood pressure [systolic blood pressure]:

The mean score of Comparison of level of blood pressure [systolic blood pressure] of adolescents with hypertension in **pretest** of **Experimental group** was 132.24±3.682 and the mean score in the **control group** was 138.45±1.593. The calculated **Independent t test** value of t = -16.91 shows ***statistically highly significant difference*** between level of blood pressure [systolic blood pressure] of adolescents with hypertension in experimental and control group of pretest.

Post-test 1 level of blood pressure [systolic blood pressure]:

The mean score of Comparison of level of blood pressure [systolic blood pressure] of adolescents with hypertension in **posttest 1** of **Experimental group** was 130.34±4.770 and the mean score in the **control group** was 138.29±2.545. The calculated **independent t test** value of t = -16.02 shows ***statistically highly significant difference*** between level of blood pressure [systolic blood pressure] of adolescents with hypertension in experimental and control group of **post-test 1**.

Post-test 2 level of blood pressure [systolic blood pressure]:

The mean score of Comparison of level of blood pressure [systolic blood pressure] of adolescents with hypertension in **posttest 2** of **Experimental group** was 120.54±1.661 and the mean score in the **control group** was 138.24±0.431. The calculated **Independent t test** value of t = -112.5 shows ***statistically highly significant difference*** between level of blood pressure [systolic blood pressure] of adolescents with hypertension in experimental and control group of **post-test 2**.

Post-test 3 level of blood pressure [systolic blood pressure]:

The mean score of Comparison of level of blood pressure [systolic blood pressure] of adolescents with hypertension in **posttest 3** of **Experimental group** was 113.82±4.264 and the mean score in the **control group** was 137.89±3.326. The calculated **Independent t test** value of t = -48.56 shows ***statistically highly significant difference*** between level of blood pressure [systolic blood pressure] of adolescents with hypertension in experimental and control group of **post-test 3**.

DIASTOLIC BLOOD PRESSURE

Pretest level of blood pressure [diastolic blood pressure]:

The mean score of Comparison of level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in **pretest** of **Experimental group** was 80.39±1.122 and the mean score in the **control group** was 81.33±2.051. The calculated **Independent t test** value of t = -4.35 shows ***statistically highly significant difference*** between level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in experimental and control group of pretest.

Post-test 1 level of blood pressure [diastolic blood pressure]:

The mean score of Comparison of level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in **posttest 1** of **Experimental group** was 78.50±0.502 and the mean score in the **control group** was 81.30±2.204. The calculated **Independent t test** value of t = -13.54 shows ***statistically highly significant difference*** between level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in experimental and control group of **post-test 1**.

Post-test 2 level of blood pressure [diastolic blood pressure]:

The mean score of Comparison of level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in **posttest 2** of **Experimental group** was 74.99±1.375 and the mean score in the **control group** was 81.24±2.258. The calculated **Independent t test** value of t = -25.76 shows ***statistically highly significant difference*** between level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in experimental and control group of **post-test 2**.

Post-test 3 level of blood pressure [diastolic blood pressure]:

The mean score of Comparison of level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in **posttest 3** of **Experimental group** was 70.89±0.722 and the mean score in the **control group** was 81.16±3.192. The calculated **Independent t test** value of t = -34.23 shows ***statistically highly significant difference*** between level of blood pressure [**diastolic blood pressure**] of adolescents with hypertension in experimental and control group of **post-test 3**. Similar results were reported by Kanji N et al.[6], showing a significant reduction in systolic and diastolic blood pressure in the intervention group ($t = 4.43$; $p<0.015$ and $t = 3.8$; $p<0.05$, respectively) using autogenic training exercise.

Table – 10 Comparison of the level of stress of adolescents with hypertension between experimental and control groups before and after administration of a multi-factorial intervention package.

(N=238 (119+119))

Test	Group	Mean	Standard deviaton	Mean difference	95% confidence interval for mean		Independent t test value	'p' value
					Lower	Upper		
Pretest	**Experimental group**	28.75	5.16	2.454	1.518	3.389	5.167	**0.000** HS**
	Control group	26.29	0.458					
Posttest	**Experimental group**	7.97	6.35	-17.64	-19.11	-16.17	-23.67	**0.000** HS**
	Control group	25.62	5.07					

p<0.001 HS- highly significant, NS-Non Significant.

Pretest level of stress:

The mean score of Comparison of level of stress of adolescents with hypertension in **pretest** of **Experimental group** was 28.75±5.16 and the mean score in the **control group** was 26.29±0.458. The calculated **independent t test** value of t = 5.167 shows ***statistically highly significant difference*** between level of stress of adolescents with hypertension in experimental and control group of pretest.

Post-test level of stress:

The mean score of Comparison of level of stress of adolescents with hypertension in **posttest** of **Experimental group** was 7.97±6.35 and the mean score in the **control group** was 25.62±5.07. The calculated **Independent t test** value of t = -23.67 shows ***statistically highly significant difference*** between level of stress of adolescents with hypertension in experimental and control group of **post-test**. This result aligns with a study conducted by Kanji N et al. (6), which demonstrated that autogenic training exercise reduced stress among the intervention groups (t = 11.10; p<0.001).

Table – 11 Comparison of the quality of life of adolescents with hypertension between experimental and control groups before and after administration of a multi-factorial intervention package.

(N=238 (119+119))

Test	Group	Mean	Standard deviaton	Mean difference	95% confidence interval for mean		Independent t test value	'p' value
					Lower	Upper		
Pretest	**Experimental group**	49.58	18.11	11.80	8.002	15.61	6.113	**0.000** HS**
	Control group	37.77	10.75					
Posttest	**Experimental group**	105.04	10.07	65.56	62.53	68.59	42.64	**0.000** HS**
	Control group	39.48	13.409					

p<0.001 HS- highly significant, NS-Non Significant.

Pretest level of quality of life:

The mean score of Comparison of level of quality of life of adolescents with hypertension in **pretest** of **Experimental group** was 49.58±18.11 and the mean score in the **control group** was 37.77±10.75. The calculated **Independent t test** value of t = 6.113 shows ***statistically highly significant difference*** between level of quality of life of adolescents with hypertension in experimental and control group of pretest.

Post-test level of quality of life:

The mean score of Comparison of level of quality of life of adolescents with hypertension in **posttest** of **Experimental group** was 105.04±10.07 and the mean score in the **control group** was 39.48±13.409. The calculated **independent t test** value of t = 42.64 shows ***statistically highly significant difference*** between level of quality of life of adolescents with hypertension in experimental and control group of **post-test**. Therefore, the results suggest that the multi-factorial intervention package led to an improvement in the quality of life among the participants in the experimental group.

Section D: Comparison of Mean Scores of blood pressure (systolic blood pressure) of adolescents with hypertension between experimental and control groups

Table 12: Comparison of Mean Scores of blood pressure (systolic blood pressure) of adolescents with hypertension between experimental and control groups

(N=238 (119+119))

Test	Groups	Mean	SD	Repeated measures ANOVA		Post Hoc Bonferroni 't' test		
				F value	p value	Comparison	MD	p value
Pretest	Experimental Group	132.24	3.682	285.95	**<0.001*** (S)**	Experimental Group vs Control group	6.21	**<0.001*** (S)**
	Control group	138.45	1.593					
Post -test 1	Experimental Group	130.34	4.77	256.73	**<0.001*** (S)**	Experimental Group vs Control group	7.95	**<0.001*** (S)**
	Control group	138.29	2.545					
Post -test 2	Experimental Group	120.54	1.661	1266.5	**<0.001*** (S)**	Experimental Group vs Control group	17.7	**<0.001*** (S)**
	Control group	138.24	0.431					
Post -test 3	Experimental Group	113.82	4.264	2358.1	**<0.001*** (S)**	Experimental Group vs Control group	24.07	**<0.001*** (S)**
	Control group	137.89	3.326					

The mean blood pressure (systolic blood pressure) in pretest was 132.24 in experimental group, and it was 138.45 in control group. Repeated measures ANOVA F-value indicated that the blood pressure (systolic blood pressure) differs among the two groups in pretest which is significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test also revealed that significant difference existed between the groups ($p<0.001$).

Regarding posttest 1, the mean blood pressure (systolic blood pressure) in post -test 1 was 130.24 in experimental, and it was 138.29 in control group. Repeated measures ANOVA F-value indicated that the blood pressure (systolic blood pressure) differs among the two groups in post -test 1 which is statistically significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test also revealed significant difference between experimental group and control group ($p<0.001$).

Regarding posttest 2, further, the mean blood pressure (systolic blood pressure) in post -test 2 further reduced to 120.54 in experimental group whereas in the control group it was 138.24. Repeated measures ANOVA F-value indicated that the blood pressure (systolic blood pressure) differs among the two groups in post -test 2 which is significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test revealed significant difference existed between experimental group and control group ($p<0.001$).

Regarding posttest 3, further, the mean blood pressure (systolic blood pressure) in post -test 2 further reduced to 113.82 in experimental group whereas in the control group it was 137.89. Repeated measures ANOVA F-value indicated that the blood pressure (systolic blood pressure) differs among the two groups in post -test 2 which is significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test revealed significant difference existed between experimental group and control group ($p<0.001$).

The decrease the level of blood pressure (systolic blood pressure) in experimental group revealed **multifactorial intervention package** was effective in decrease the blood pressure (systolic blood pressure) among adolescents with hypertension in experimental group

Section E: Comparison of Mean Scores of blood pressure (diastolic blood pressure) of adolescents with hypertension between experimental and control groups.

Table 13: Comparison of Mean Scores of blood pressure (diastolic blood pressure) of adolescents with hypertension between experimental and control groups.

Test	Groups	Mean	SD	Repeated measures ANOVA		Post Hoc Bonferroni 't' test		
				F value	p value	Comparison	MD	p value
Pretest	Experimental Group	80.39	1.122	18.95	**<0.001*** (S)**	Experimental Group vs Control group	0.94	**<0.001*** (S)**
	Control group	81.33	2.051					
Post -test 1	Experimental Group	78.5	0.502	183.49	**<0.001*** (S)**	Experimental Group vs Control group	2.8	**<0.001*** (S)**
	Control group	81.3	2.204					
Post -test 2	Experimental Group	74.99	1.375	664.1	**<0.001*** (S)**	Experimental Group vs Control group	6.25	**<0.001*** (S)**
	Control group	81.24	2.258					
Post -test 3	Experimental Group	70.89	0.722	1171.8	**<0.001*** (S)**	Experimental Group vs Control group	10.27	**<0.001*** (S)**
	Control group	81.16	3.196					

The mean blood pressure (diastolic blood pressure) in pretest was 80.39 in experimental group, and it was 81.33 in control group. Repeated measures ANOVA F-value indicated that the blood pressure (diastolic blood pressure) differs among the two

groups in pretest which is significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test also revealed that significant difference existed between the groups ($p<0.001$).

Regarding posttest 1, the mean blood pressure (diastolic blood pressure) in post -test 1 was 78.5 in experimental, and it was 81.3 in control group. Repeated measures ANOVA F-value indicated that the blood pressure (diastolic blood pressure) differs among the two groups in post -test 1 which is statistically significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test also revealed significant difference between experimental group and control group ($p<0.001$).

Regarding posttest 2, further, the mean blood pressure (diastolic blood pressure) in post -test 2 further reduced to 74.99 in experimental group whereas in the control group it was 81.24. Repeated measures ANOVA F-value indicated that the blood pressure (diastolic blood pressure) differs among the two groups in post -test 2 which is significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test revealed significant difference existed between experimental group and control group ($p<0.001$).

Regarding posttest 3, further, the mean blood pressure (diastolic blood pressure) in post -test 2 further reduced to 70.89 in experimental group whereas in the control group it was 81.16. Repeated measures ANOVA F-value indicated that the blood pressure (systolic blood pressure) differs among the two groups in post -test 2 which is significant ($p<0.001$). Post-Hoc Bonferroni multiple comparison test revealed significant difference existed between experimental group and control group ($p<0.001$).

The decrease the level of blood pressure (diastolic blood pressure) in experimental group revealed **multifactorial intervention package** was effective in decrease the blood pressure (diastolic blood pressure) among adolescents with hypertension in experimental group.

Section F: Correlation between the post-test level of knowledge, blood pressure, stress and quality of life of adolescents with hypertension in the experimental and control groups.

Table –14: Correlation between the post-test level of knowledge, blood pressure, stress and quality of life of adolescents with hypertension in the experimental and control groups.

(N=238 (119+119))

Correlation between the post-test level of knowledge, blood pressure, stress and quality of life of Adolescents with hypertension		**Mean**	**Standard deviaton**	**'r' value**	**'p' value**	**Correlation**
Experimental group	Level of **knowledge**	27.82	4.150	0.723	**0.000 *HS**	**Positive**
	Level of blood pressure	130.34	4.770			
Control group	Level of **knowledge**	11.87	2.726	0.329	**0.000 *HS**	**Positive**
	Level of blood pressure	138.29	2.545			
Experimental group	Level of **blood pressure**	130.34	4.77	0.969	**0.000 *HS**	**POSITIVE**
	Level of stress	7.97	6.35			
Control group	Level of **blood pressure**	138.29	2.54	0.448	**0.000 *HS**	**POSITIVE**
	Level of stress	25.62	5.07			
Experimental group	Level of **stress**	7.97	6.35	0.399	**0.000 *HS**	**POSITIVE**
	Level of quality of life	105.04	10.07			
Control group	Level of **stress**	25.62	5.07	0.295	**0.000 *HS**	**POSITIVE**
	Level of quality of life	39.48	13.409			
Experimental group	Level of **quality of life**	105.04	10.07	0.266	**0.003 *S**	**POSITIVE**
	Level of knowledge	27.82	4.15			
Control group	Level of **quality of life**	39.48	13.4	-0.315	**0.000 *HS**	**NEGATIVE**
	Level of knowledge	11.87	2.72			

-p < 0.001 highly significant. NS-Non significant

The present study revealed significant positive correlations in the posttest between the level of knowledge and blood pressure in both the experimental group (r-value: 0.723; p<0.001) and the control group (r-value: 0.329; p<0.001). Similarly, a positive correlation was observed between the level of blood pressure and the level of stress in the experimental (r-value: 0.969; p<0.001) and the control group (r value:0.448; p<0.001). These findings align with the findings of Mega F et al. (19), who conducted a cross-sectional study on 262 teenagers in Indonesia and found a significant correlation between stress level and blood pressure (p<0.05). Furthermore, regarding the level of stress and quality of life, significant positive correlations were found in the experimental group (r-value: 0.399; p<0.001) and the control group (r value:0.295; p<0.001). This result is consistent with the findings of Serguei V N et al. (16), who discovered a positive correlation between blood pressure and the level of anxiety (r = 0.77; p<0.01). Additionally, a significant positive correlation was found between the quality of life and the level of knowledge in the experimental group (r-value: 0.266; p<0.003). **However, in the control group, a negative correlation (r-value: -0.315; p<0.001) was observed, indicating a significant association (p<0.001).**

Section G: Association between the pre-test level of knowledge, blood pressure, stress and quality of life among adolescents with hypertension and their selected demographic variables, diet pattern and physical activity variables in the experimental and control groups.

In the experimental group, there was a significant association between the participants' socioeconomic status and their pre-test knowledge level (*p-value <0.001*). The age of the participants (*p-value <0.02*), religion (*p-value <0.01*), socioeconomic status (*p-value <0.002*), consumption of non-vegetarian foods (*p-value <0.05*), and usage of salt (*p-value <0.05*) were significantly associated with the pre-test level of blood pressure. The pre-test stress level and socioeconomic status (*p-value <0.001*) were significantly associated with stress in the experimental group. In contrast, religion (*p-value <0.05)*, socioeconomic status (*p-value <0.001*), and consumption of junk foods (*p-value <0.001*) were significantly associated with stress in the control group. This finding is supported by a study conducted by (20) that found a strong association between unfavorable socioeconomic circumstances and adolescent hypertension. In the control group, the participants' socioeconomic status (p–value <0.001) and

consumption of junk foods (p-value <0.001) were significantly associated with the pre-test level of knowledge.

In the control group, age (p-value <0.001), socioeconomic status (p-value <0.05), and consumption of junk foods (p-value <0.001) were found to be significantly associated with the pre-test level of blood pressure. In the control group, consumption of fruits (*p-value <0.004*), consumption of junk foods (*p-value <0.001*), consumption of salt (*p-value <0.001*), school transportation (*p- value <0.01*), physical activity (*p-value <0.001*), hours spent in outdoor games (*p-value <0.001*) and hours spent watching television (*p-value <0.001*) were significantly associated with the pre- test quality of life.

CHAPTER VI

SUMMARY & CONCLUSION IMPLICATIONS AND RECOMMENDATIONS

In light of the growing concern over hypertension among adolescents and the recognition of various risk factors contributing to its prevalence, it is imperative to address this issue effectively. Among 1142 adolescents screened in Ariyankuppam commune panchayat, 273 were hypertensive in Phase I. With 238 hypertensive adolescents in Phase II, the effectiveness of the multi-factorial intervention package was studied in both experimental and control groups. The results show that the systolic and diastolic blood pressure was reduced, the level of knowledge was improved, stress levels were reduced, and the quality of life was improved among the adolescents after the intervention of this package, as mentioned above.

To conclude, the findings of this study highlight the effectiveness of the multi-factorial intervention package in addressing hypertension among adolescents had positive outcomes for all the aspects of dependent variables. Incorporating beetroot juice administration, autogenic training exercises and structured teaching programs could significantly improve the health and well-being of hypertensive adolescents.

IMPLICATIONS

The study findings show significant difference in pretest and posttest in both the control and experimental group, it represents that mutlifactorail intervention package played major role in the lowering of blood pressure among hypertensive adolescents. These findings of the study have implications for nursing education, nursing practice, nursing administration and nursing research.

NURSING PRACTICE

In nursing practice, the study highlights the importance of adopting comprehensive approaches in caring for hypertensive adolescents, addressing not only their medical needs but also providing health education and support. Some of the few practices could be followed for the better outcome of the services are follows,

1. Health education: Nurses should provide comprehensive health education to hypertensive adolescents and their families. This includes educating them about hypertension, its risk factors, lifestyle modifications, medication management, and stress reduction techniques.

2. Individualized care: Develop individual care plans for each hypertensive adolescent, considering their unique needs, preferences, and health conditions.

NURSING EDUCATION

Nursing education is a critical component in the successful implementation of the multifactorial intervention package aimed at lowering blood pressure, reducing stress, enhancing knowledge, and improving the quality of life among hypertensive adolescents. Some of the nursing education would be incorporated for the further improvement and change in the life of the adolescents,

1. Advanced training: Specialized training for the nurses could be offered to equip them with in-depth knowledge about hypertension management, stress reduction techniques, and effective educational strategies through workshops, seminars and online courses.

2. Evidence -Based Practice: Educating nurses about the latest research and best practices in managing hypertension among adolescents to ensure that their interventions are supported by scientific evidence.

NURSING RESEARCH

To further enhance knowledge in this area, future research in hypertension management among adolescents should consider the following nursing implications:

1. Long term follow-up: Conducting studies with longer follow-up periods to assess the sustained effects of interventions on hypertension control and overall health

2. Comparative studies: Performing comparative studies to evaluate the effectiveness of different intervention approaches, aiding in identifying the most suitable strategies.

RECOMMENDATIONS

1. Health education and awareness: Implementing comprehensive health education programs targeting adolescents to increase awareness about hypertension, its risk factors, and preventive measures.
2. Lifestyle modifications: encouraging and supporting adolescents to adopt healthy lifestyle habits, including regular physical activity, balanced diet, and stress management techniques.
3. Regular health screenings: Promoting regular health check-ups and screenings in schools and communities to identify hypertension cases early and initiate timely interventions.
4. Accessible healthcare: ensuring access to affordable and quality health care services for all adolescents, especially in underserved areas.
5. School and family involvement: involving schools and families in hypertension prevention and management efforts, creating a supportive environment for adolescents.

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ANNEXURES

CLINICAL TECHNIQUE

CarboTech Protectable Adaptive Equipment

Ramaprabhu Zanaguiram

Abstract

The present invention discloses a CarboTech protectable adaptive equipment to prevent head injury caused due to fall among subjects with neurodegenerative disorders and also elderly individuals and cerebral palsy children with fall risk. The equipment of the present invention comprises a collar with center front closure and on/off button housed with an airbag and a control igniter valve with inflate chamber of either compressed gas (CO_2/atm gases) cartridge or mini endothermic gas reaction to produce gas instantaneously (NaN_3), sensors, battery, mini microprocessor board, gas exhaust control valves, piezoelectric alert buzzer, and global system for mobile (GSM)-enabled global positioning system (GPS) tracker.

Keywords: Adaptive equipment, Carbotech, Cerebral palsy, Elderly, Fall risk, Self-care management.

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Introduction

CarboTech protectable adaptive equipment for supporting a person's head at various angular positions when they are about to fall. The carbotech is a collar that could be worn around the neck while walking or traveling. The airbag is shaped like a hood, surrounding and protecting the client's head. The trigger mechanism is controlled by sensors which pick up the abnormal movements of a client when he or she is about to fall.

Block Diagram: Carbotech Protectable Adaptive Equipement

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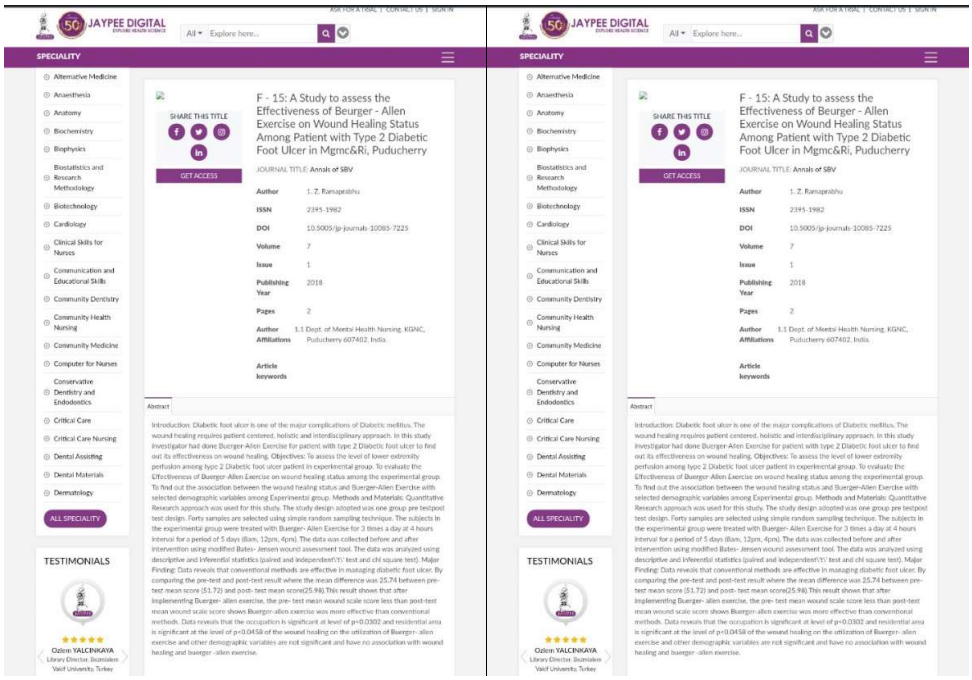
is on, it monitors the client movement. When they tend to fall, the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Suggestions and Comments

Thank You for Your Valuable Comments and Feedback

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